

CLAIMS

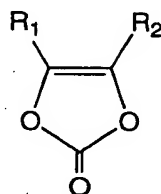
1. A non-aqueous electrolytic secondary battery comprising at least:

5 an electrode group having a positive electrode, a negative electrode which contains a material being capable of storing and releasing lithium ions, and a separator disposed between the positive electrode and the negative electrode; and

10 a non-aqueous electrolytic solution containing a non-aqueous solvent(s) and a lithium salt dissolved in the non-aqueous solvent, with which the electrode group being impregnated, wherein

(1) the electrode group is contained in a casing made
15 of a sheet having a resin layer with a thickness of 0.5 mm or less,

(2) the non-aqueous solvent contains γ -butyrolactone, ethylene carbonate, at least one vinylene carbonate compound represented by the formula (I):

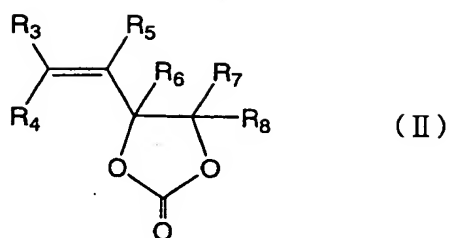


(I)

20

wherein R₁ and R₂ each independently represent a hydrogen atom or an alkyl group having 1 to 4 carbon atoms,

and at least one vinylene carbonate compound
25 represented by the formula (II):



wherein R_3 , R_4 and R_5 each independently represent a hydrogen atom or an alkyl group having 1 to 4 carbon atoms, and R_6 , R_7 and R_8 each independently represent a hydrogen atom, an alkyl group having 1 to 4 carbon atoms or an alkenyl group having 2 to 7 carbon atoms,

(3) the amount of the vinylene carbonate compound is 0.01 to 5 % by weight based on the total weight of the non-aqueous solvent, the amount of the vinyl ethylene carbonate compound is 0.01 to 5 % by weight based on the total weight of the non-aqueous solvent, and the total amount of the vinylene carbonate compound and the vinyl ethylene carbonate compound is 0.02 to 6 % by weight based on the total weight of the non-aqueous solvent, and

(4) the amount of the γ -butyrolactone is 50 % by volume or more based on the total volume of the non-aqueous solvent and the amount of the ethylene carbonate is 10 % by volume or more based on the total volume of the non-aqueous solvent.

2. A non-aqueous electrolytic solution for a secondary battery,

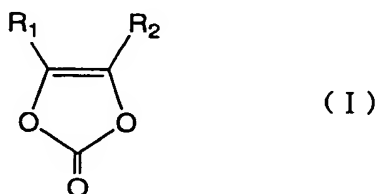
where the secondary battery has at least:

an electrode group having a positive electrode, a negative electrode which contains a material being capable of storing and releasing lithium ions, and a separator disposed between the positive electrode and the negative electrode, the electrode group being contained in a casing made of a sheet having a resin layer with a thickness of

0.5 mm or less; and

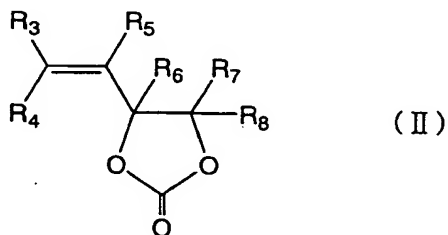
a non-aqueous electrolytic solution comprising a non-aqueous solvent(s) and a lithium salt dissolved in the non-aqueous solvent, with which the electrode group being
5 impregnated, wherein

(1) the non-aqueous solvent contains γ -butyrolactone, ethylene carbonate, at least one vinylene carbonate compound represented by the formula (I):



10 wherein R_1 and R_2 each independently represent a hydrogen atom or an alkyl group having 1 to 4 carbon atoms,

and at least one vinylene carbonate compound represented by the formula (II):



15 wherein R_3 , R_4 and R_5 each independently represent a hydrogen atom or an alkyl group having 1 to 4 carbon atoms, and R_6 , R_7 and R_8 each independently represent a
20 hydrogen atom, an alkyl group having 1 to 4 carbon atoms or an alkenyl group having 2 to 7 carbon atoms,
(2) the amount of the vinylene carbonate compound is 0.01 to 5 % by weight based on the total weight of the non-

aqueous solvent, the amount of the vinylethylene carbonate compound is 0.01 to 5 % by weight based on the total weight of the non-aqueous solvent, and the total amount of the vinylene carbonate compound and the vinylethylene carbonate
5 compound is 0.02 to 6 % by weight based on the total weight of the non-aqueous solvent, and

(3) the amount of the γ -butyrolactone is 50 % by volume or more and the amount of the ethylene carbonate is 10 % by volume or more based on the total volume of the
10 non-aqueous solvent.